



Service Electronics

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Handling Boards

ESD protection



CAUTION! - The boards can be destroyed by static discharge!

- Before opening the printer, place it on a grounded surface.
- Earth your body using an ESD bracelet or other suitable means, before touching a board. If no suitable ESD protection is available, touch an earthed object, e.g. a heating radiator, before touching a board.
- Only place boards on earthed surfaces.

Handling

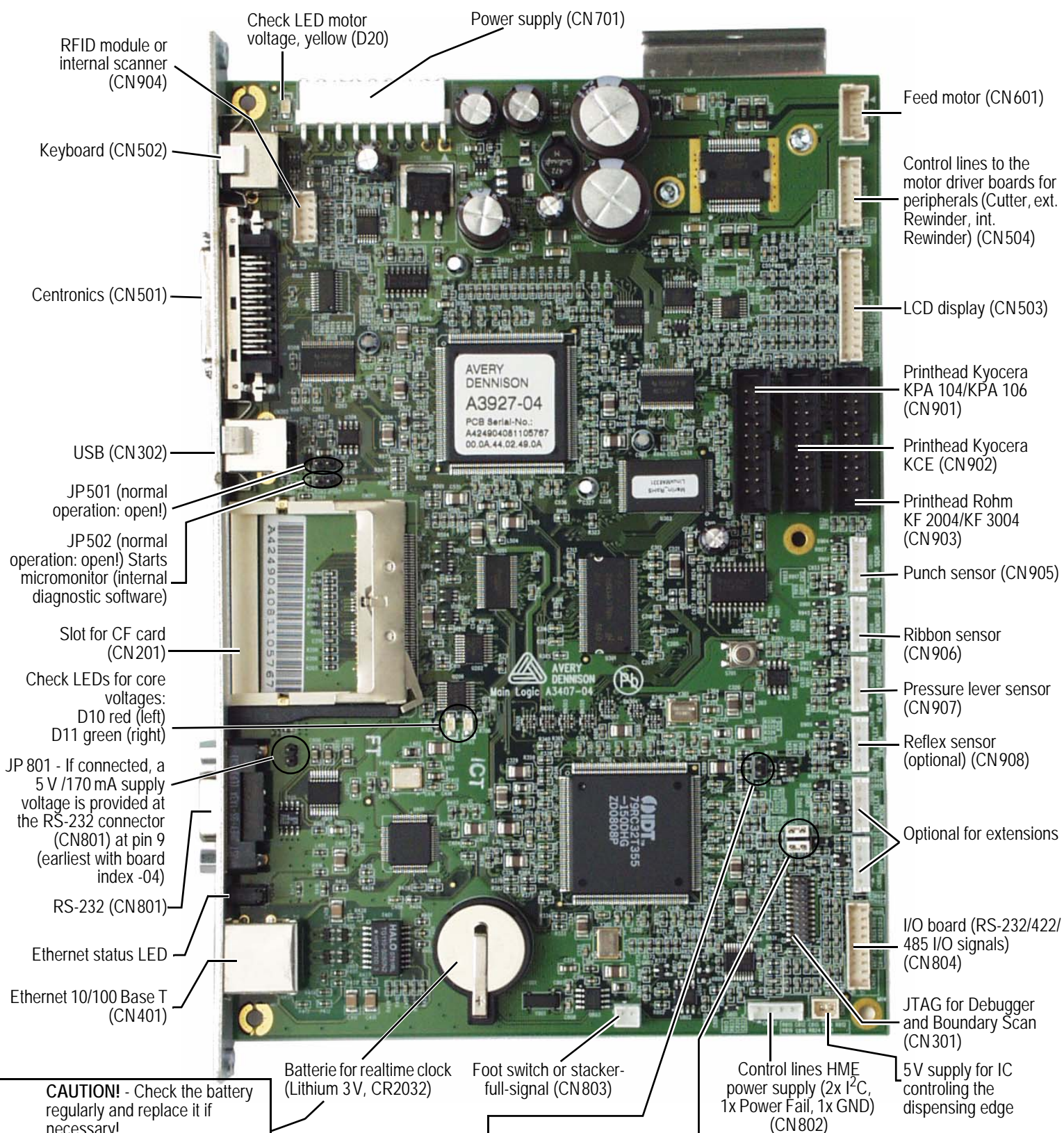


CAUTION! - The conducting tracks on the boards are very thin. If a board is bent or warped, the conducting tracks can easily crack.

- Avoid bending or warping boards.
- Avoid the use of excessive force when removing or inserting boards.

CPU Boards

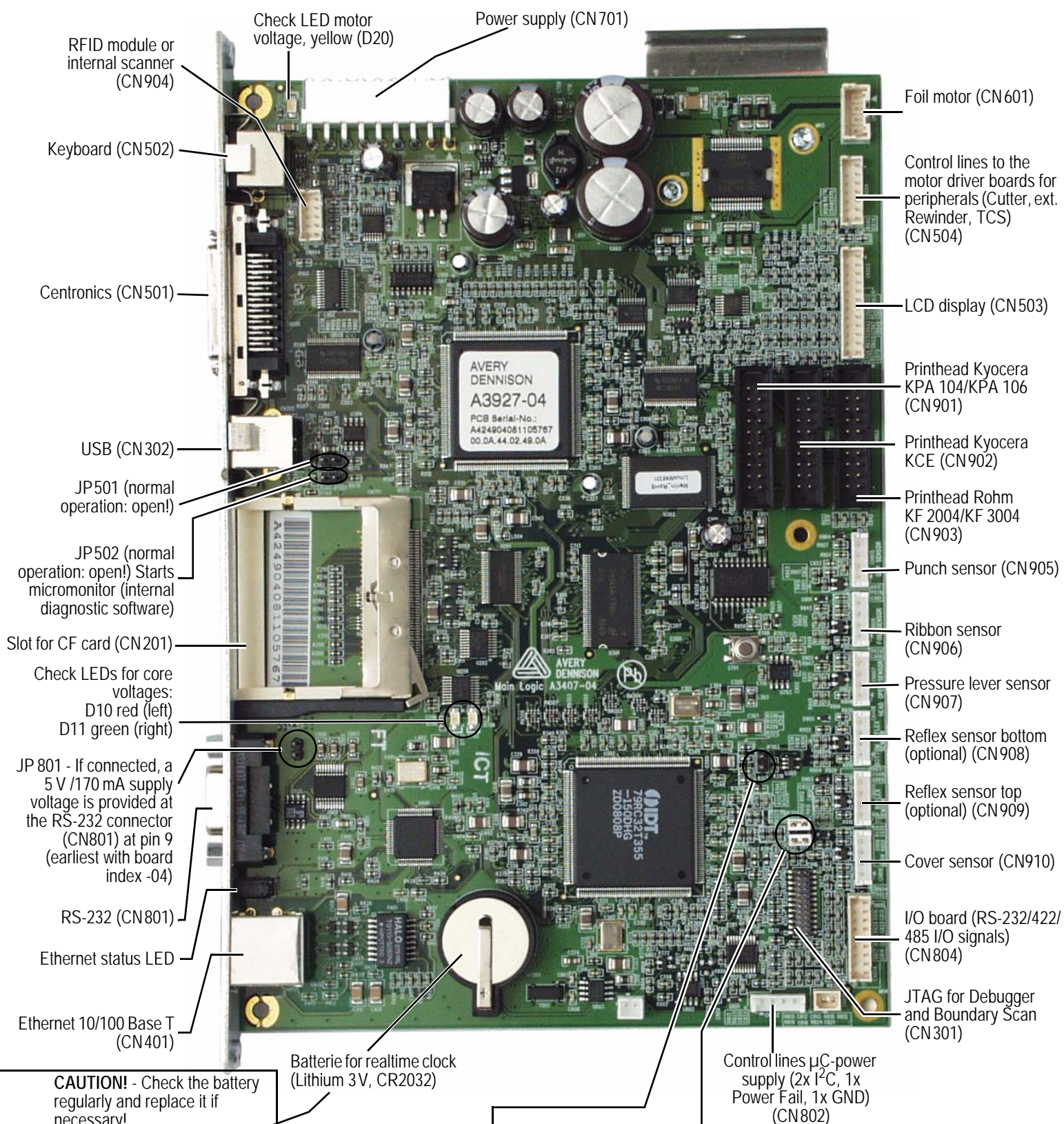
AP 5.4 Layout



Function	JP303 open (normal operation)	JP 303 closed
Boundary Scan	On	Off
Debug Port	Off	On
Signals I/O board	On	Off

Jumper	Boundary Scan	Debug
JP 301		
JP 302		

AP 7.t Layout



CAUTION! - Check the battery regularly and replace it if necessary!

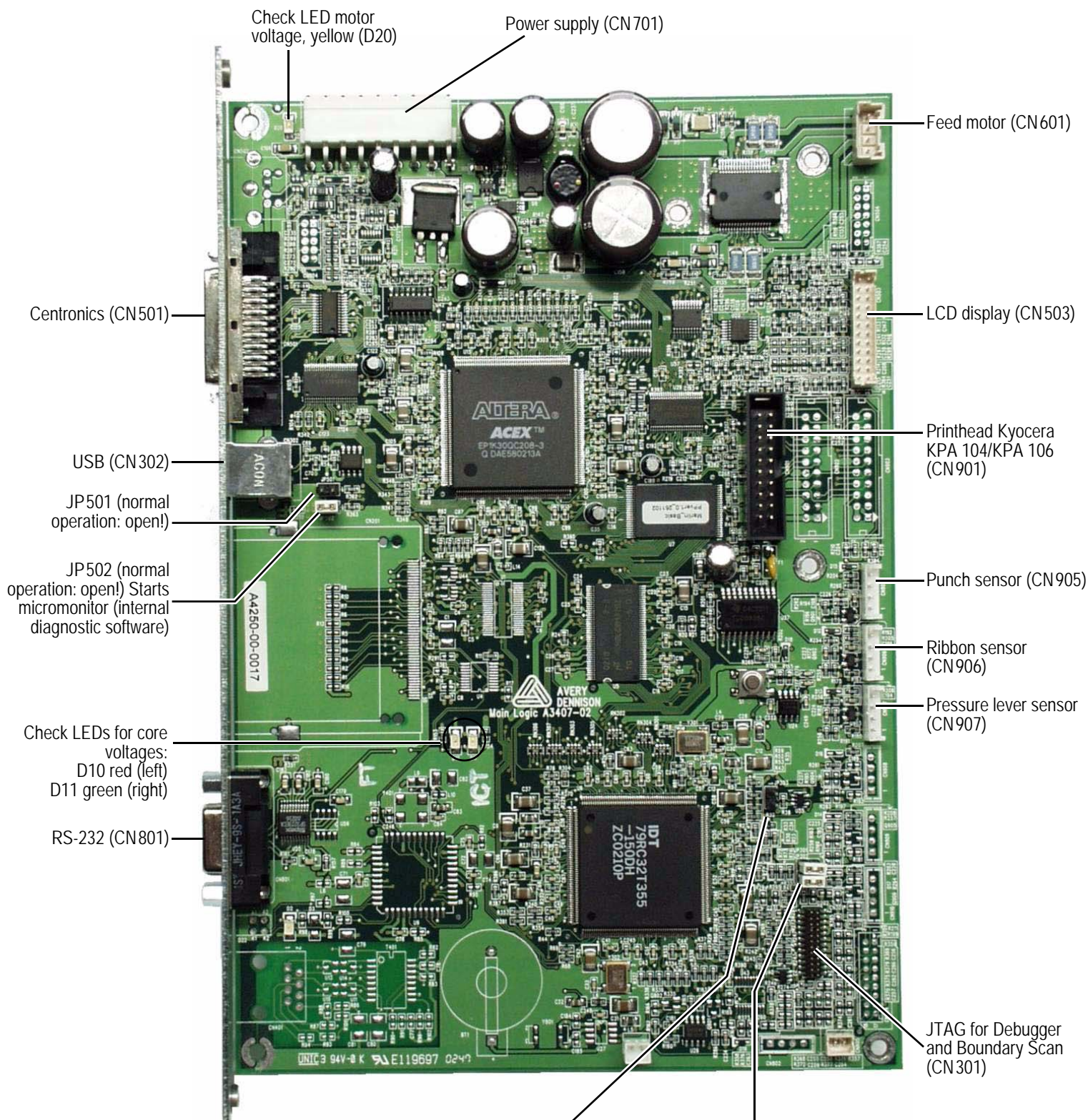
WARNING! - Danger of explosion, if the battery is incorrectly replaced!!

AVERTISSEMENT! - Il y a un danger d'explosion, si la batterie est remplacée incorrectement!!

Function	JP303 open (normal operation)	JP 303 closed
Boundary Scan	On	Off
Debug Port	Off	On
Signals I/O board	On	Off

Jumper	Boundary Scan	Debug
JP 301		
JP 302		

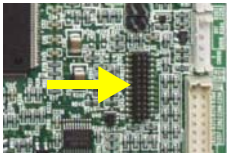
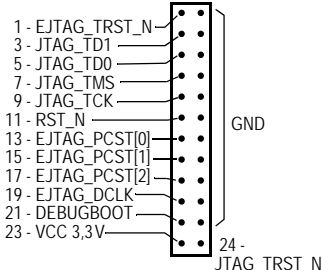
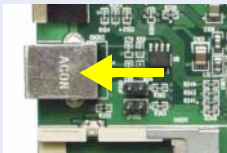
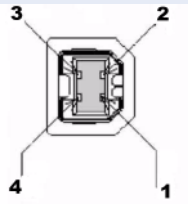
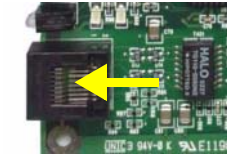
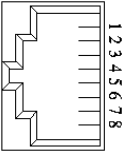
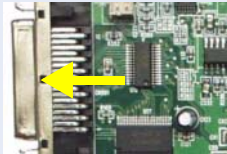
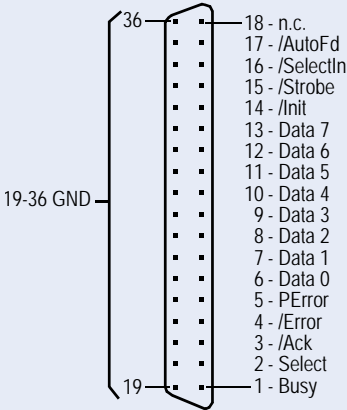
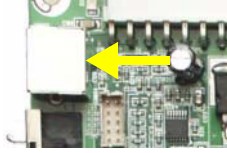
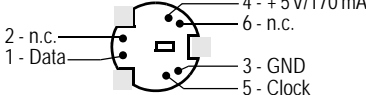
AP 4.4 Layout

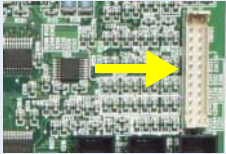
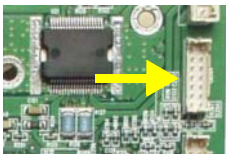
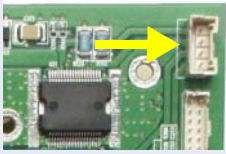
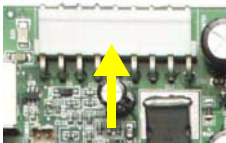
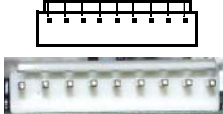
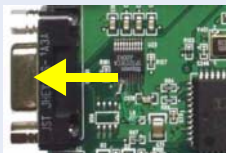
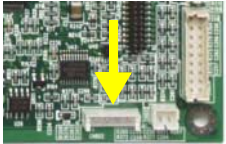
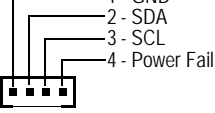


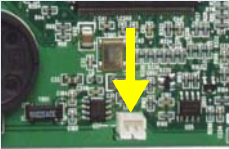
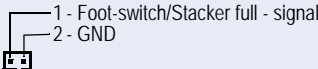
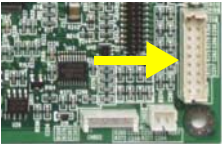
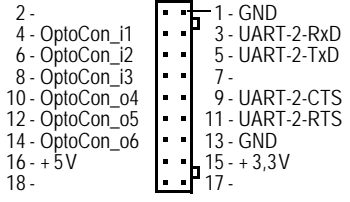
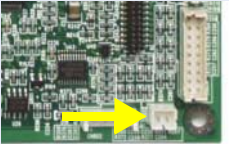
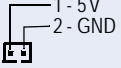
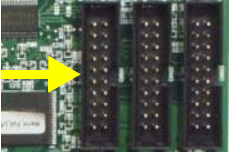
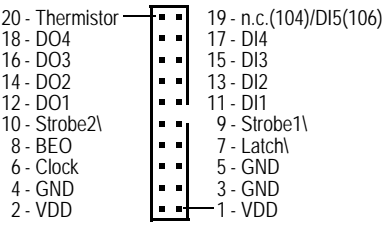
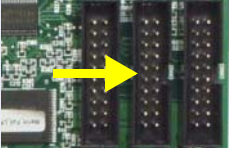
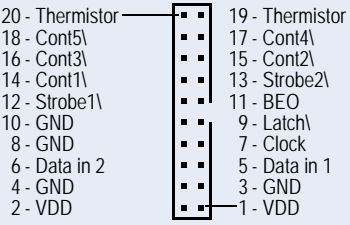
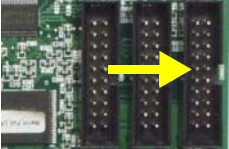
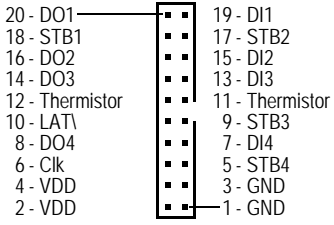
Function	JP303 open (normal operation)	JP 303 closed
Boundary Scan	On	Off
Debug Port	Off	On
Signals I/O board	On	Off

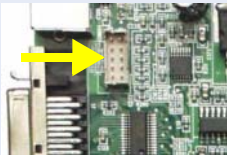
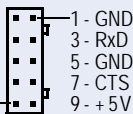

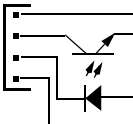

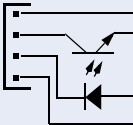

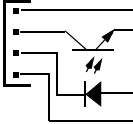
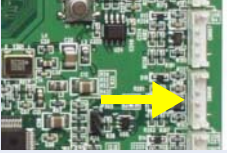
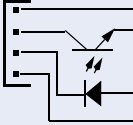
Jumper	Boundary Scan	Debug
JP301		
JP302		

Connectors

Function / Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
JTAG/DEBUG 	CN 301	2x12pin 1.27 mm grid		
USB 	CN 302	USB type B		
Ethernet 	CN 401	RJ 45		
Centronics 	CN 501	IEEE1284 C 36pin	IEEE1284 C 36pin	
Keyboard 	CN 502	PS/2	PS/2	

Function / Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
Display 	CN 503	JST B24B-PHDSS	JST BHDR-24VS	<div> <div> 2 - D0 4 - D1 6 - D2 8 - D3 10 - D4 12 - D5 14 - D6 16 - D7 18 - +5V 20 - GND 22 - E 24 - E2 (CS2) </div> <div> 1 - Key Prog/Esc 3 - Key Feed 5 - Key Cut 7 - Key Online 9 - E1 (CS1) 11 - RS (A0) 13 - R/ nW 15 - LED Error 17 - +5V 19 - GND 21 - GND 23 - nReset </div> </div>
Peripherals motor driver 	CN 504	JST B14B-PHDSS	JST PHDR-14VS	<div> <div> 2 - Foilmotor CLK 4 - GND 6 - Perimotor CLK 8 - GND 10 - SDA 12 - +5V 14 - GND </div> <div> 1 - Motor CLK 3 - Motor CW/CCW 5 - PWM 7 7 - Rewinder Cntrl 9 - SCL 11 - nMaster Reset 13 - GND </div> </div>
Stepper motor 	CN 601	JST B04B-XASK-1	JST XAP-04V-1	<div> <div> 1 - Out 2B 2 - Out 1B 3 - Out 1A 4 - Out 2A </div> </div>
Power supply 	CN 701	JST B9PS-VH	JST VHR-9N	<div> <div> 4 - Power Fail 3 - Temp. Sense 2 - GND 1 - +5V </div> <div> 5 - GND 6 - Motor Supply 45V 7 - Motor Supply 45V 8 - GND 9 - GND </div>  </div>
RS232 	CN 801	DSub9-F	DSub9-M (1:1 cable to the host)	<div> <div> 9 - (RI) 8 - CTS 7 - RTS 6 - (DSR) </div> <div> 5 - GND 4 - (DTR) 3 - TxD 2 - RxD 1 - (CD) </div> </div> <p>Pin 9 provides 5 V/170 mA, if JP801 is connected.</p> <p>CAUTION! Pin assignment looked at from „PC point of view“! (Printer = DCE)</p>
Power supply control 	CN 802	JST B4B-EH-A		<div> <div> 1 - GND 2 - SDA 3 - SCL 4 - Power Fail </div>  </div>

Function / Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
Foot switch 	CN 803	JST B2B-EH-A	AUK MM-02H	
I/O board 	CN 804	JST B18B- PHDSS	JST PHDR- 18VS	
5V for IC controlling the dispensing edge sensor 	CN 805	Molex 53014- 0210	Molex 51004- 0200	
Printhead KPA 104/106 	CN 901	AMP 281274-1	Molex 5320	
Printhead KCE 	CN 902	AMP 281274-1	Molex 5320	
Printhead 2004/ 3004 	CN 903	AMP 281274-1	Molex 5320	

Function / Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
RFID or internal Scanner 	CN 904	JST B10B- PHDSS	JST PHDR- 10VS	2 - TxD 4 - GND 6 - GND 8 - RTS 10 - GND 1 - GND 3 - RxD 5 - GND 7 - CTS 9 - +5V 
Punch sensor 	CN 905	JST B4B-EH-A	JST EHR-4	4 - Emitter 3 - Collector 2 - Cathode 1 - Anode 
Ribbon sensor 	CN 906	JST B4B-EH-A	JST EHR-4	4 - Emitter 3 - Collector 2 - Cathode 1 - Anode 
Pressure lever sensor 	CN 907	JST B4B-EH-A	JST EHR-4	4 - Emitter 3 - Collector 2 - Cathode 1 - Anode 
Reflex sensor 	CN 908	JST B4B-EH-A	JST EHR-4	4 - Emitter 3 - Collector 2 - Cathode 1 - Anode 

Lithium Battery

The CPU board used in the AP 5.4 is equipped with a realtime clock, which keeps its setting, if the printer is switched off. This is done by a lithium battery on the board.

■ The battery is *not rechargeable*!

■ The battery must be UL-listed!

Battery type

Panasonic CR2032 or an equivalent battery type.



WARNING!

Danger of explosion if battery is incorrectly replaced.

- Replace only with the same or equivalent type recommended by the manufacturer.
- Take care of the correct polarity when replacing the battery.
- Discard used batteries according to the manufacturer's instructions.



AVERTISSEMENT!

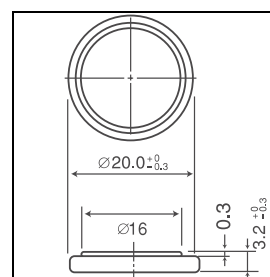
Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.

- Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur.
- Mettre au rebut les batteries conformément aux instructions du fabricant.

Specifications

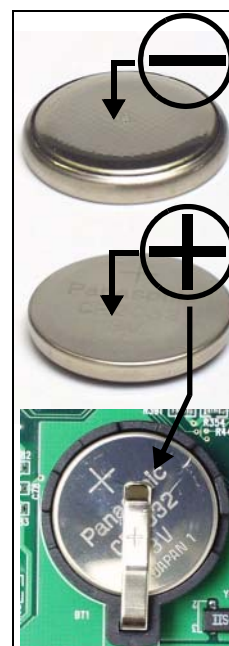
Nominal voltage	3 V
Nominal capacity	220 mAh
Continuous standard load	0.2 A
Operating temperature	-30 to +60 °C
Max. abnormal charging current	5.0 mA

[Tab. 1] Battery type CR2032 - specifications and dimensions.



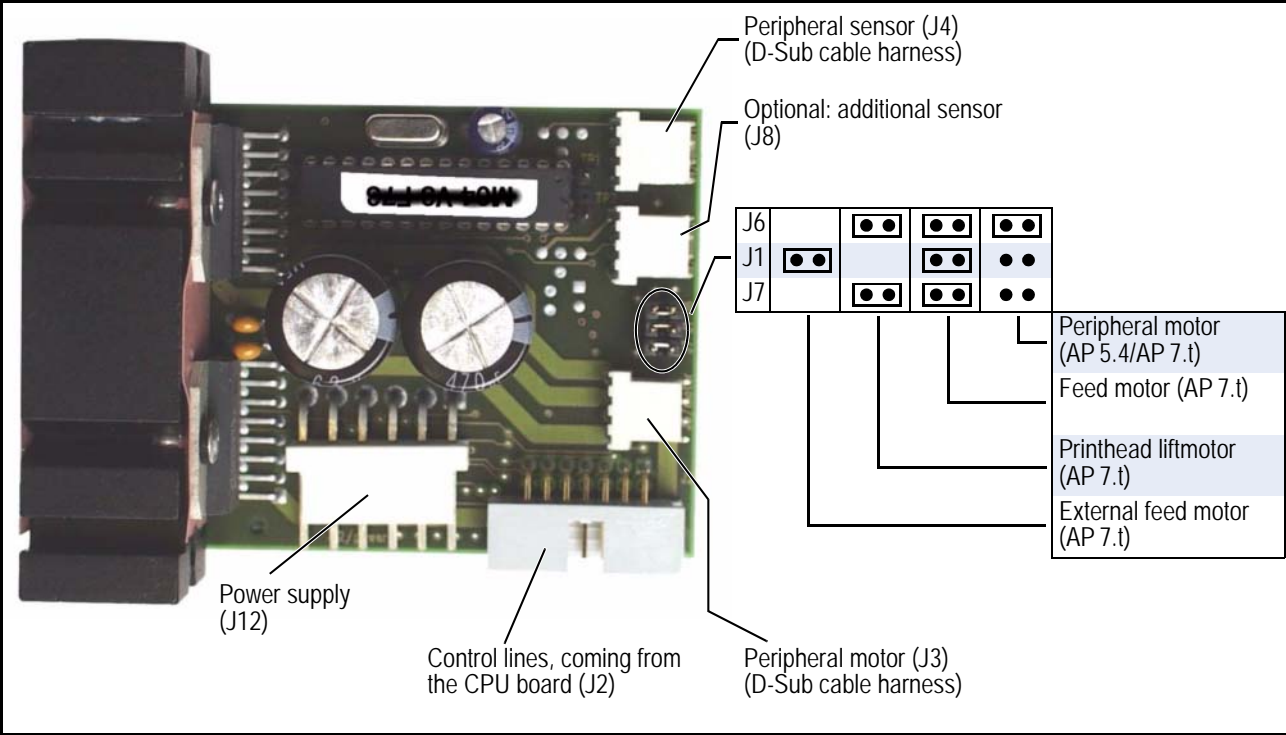
Battery replacement

1. Switch off the printer. Disconnect the power cord.
2. Take off the rear hood.
 - Prior to installation of the new battery: wipe the battery and the equipment terminal clean using a dry cloth.
 - Ensure, that dust and other foreign substances will not cause shorting between the poles.
 - When handling batteries, wear finger covers or gloves made of rubber, cotton, etc. to protect the battery from dirt.
3. Take used battery out of the socket; insert the new battery.
 - Take care of the correct polarity (see fig. right)!
4. Reassemble the rear hood.
5. Reconnect the printer to the mains and switch it on.
6. Set time and date (SYSTEM PARAMETER > Realtime clock).




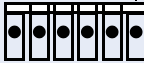
Output Stage Stepper Motor

Layout



Connectors

Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
	J4	PANCON MLAS 100-04	AMP 643813-4 or AUK MK-04H	1 - A 2 - K (GND) 3 - C 4 - E (GND)
	J3	PANCON MLAS 100-04	AMP 643813-4 or AUK MK-04H	1 - A 2 - A\ 3 - B 4 - B\
	J2	Wieson 2120-14RS5	MOLEX 70450 Version b	11 - Reset\ 9 - I2C-SCL 1 - Clock 0 10 - I2C-SDA 14 - GND

Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
	J12	AMP 640389-6	AMP 0-644465-6 MTA 156 18 AWG	<div><div>1 - 5V</div><div>2 - GND</div><div>3 - n.b.</div><div>4 - GND</div><div>5 - 38..54V</div><div>6 - GND</div></div> 

Output Stage Brushless Motor (AP 5.4)

Notes

- BLDC = brushless direct current
- Application: AP 5.4 with internal rewinder

Firmware Version

Printer	BLDC
3.33	6

[Tab. 2] Required firmware version for the BLDC output stage.

Checking the driver firmware version:

→ Call PRINT INFO > Service status.

Section „Peripheraldriver“ on the printout lists all mounted output stage boards with the installed firmware versions.

Updating the driver firmware is done the same way as with the printer firmware:

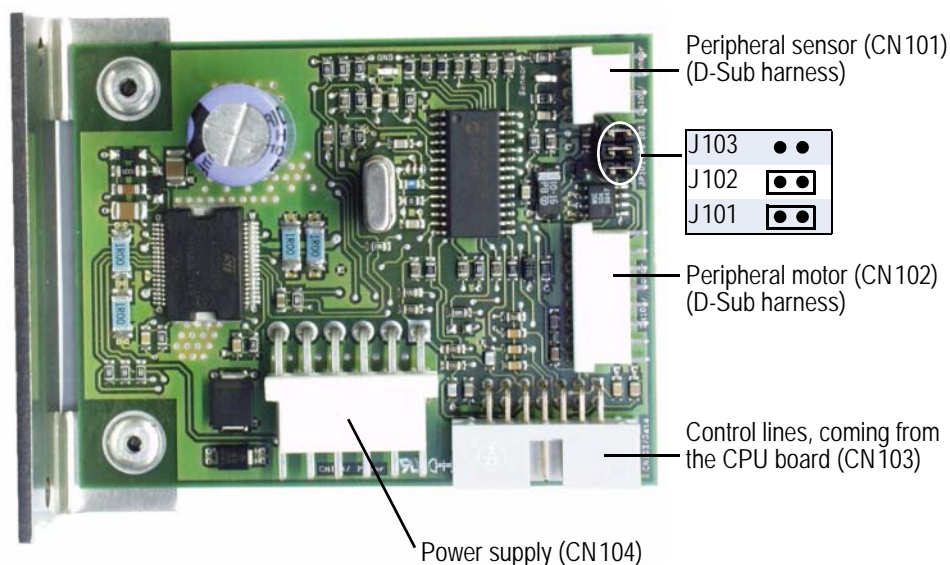
- See topic section [Firmware](#).

The following files are required: BLDC_Vx.BAT resp. BLDCAP54Vx.S3B (for firmware version x, see [Tab. 2]).

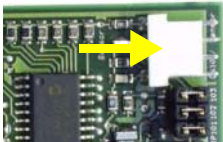
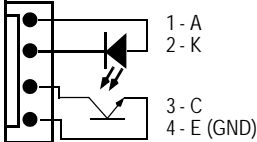
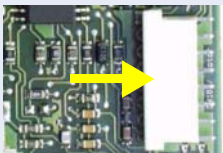
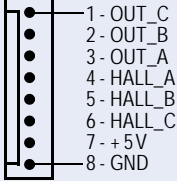
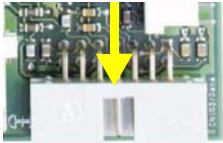
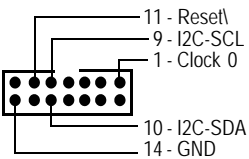
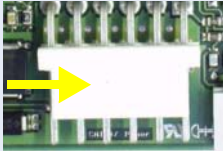
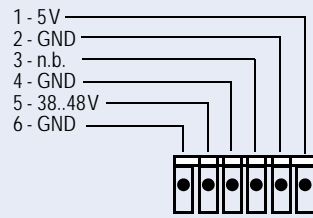


⚠ CAUTION! - Don't load the older firmware version 1 onto the new version 2!

Layout



Connectors

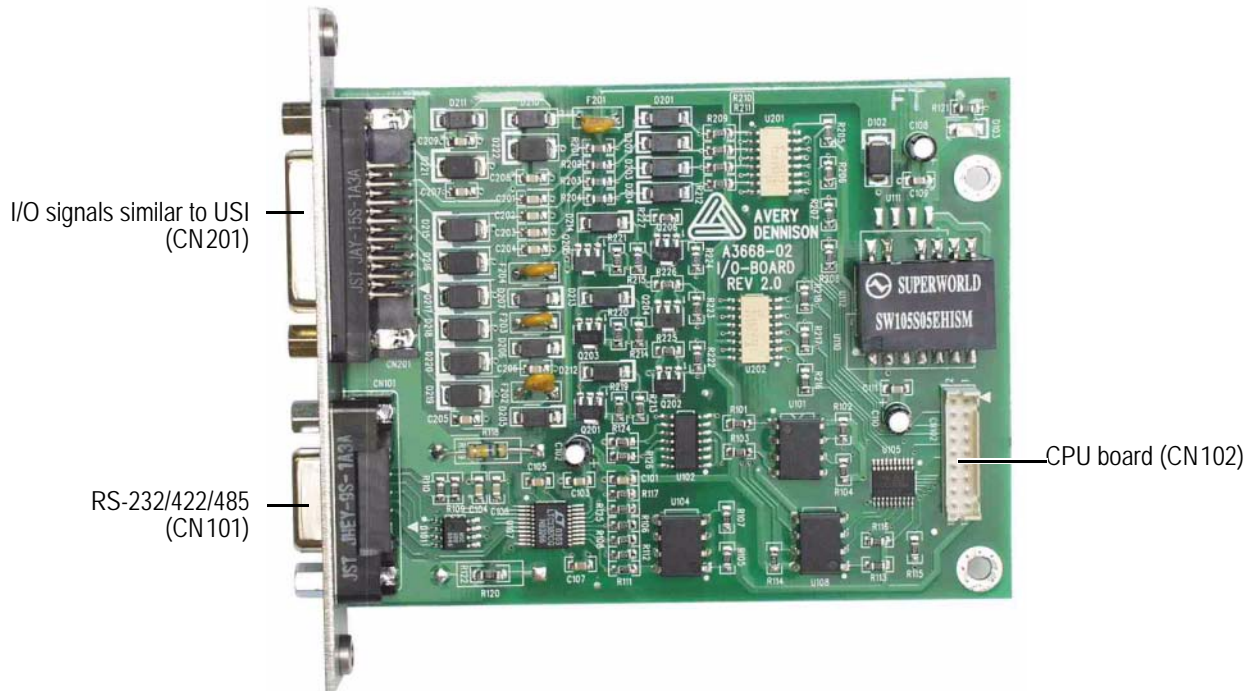
Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
	CN101	PANCON MLAS 100-04	AMP 643813-4 or AUK MK-04H	
	CN102	PANCON MLAS 100-08		
	CN103	Wieson 2120-14RS5	MOLEX 70450 Version b	
	CN104	AMP 640389-6	AMP 0-644465-6 MTA 156 18 AWG	

I/O Board

Requirements

- Printer: AP 5.4, AP 7.t
- Printer firmware version: 2.31 or higher

Layout



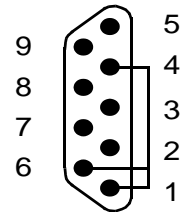
Connectors

Picture	Conn. #	Type on board	Type at cable	Pin assignment on board
	CN102	JST B18B-PHDSS	JST PHDR-18VS	<div> <div> 2 - 4 - OptoCon_i1 6 - OptoCon_i2 8 - OptoCon_i3 10 - OptoCon_o4 12 - OptoCon_o5 14 - OptoCon_o6 16 - +5V 18 - </div> <div> 1 - GND 3 - UART-2-RxD 5 - UART-2-TxD 7 - 9 - UART-2-CTS 11 - UART-2-RTS 13 - GND 15 - +3,3V 17 - </div> </div>
	CN201	DSub15-F JST JAY-15S-1A3A	DSub15-M	<div> 15 MACHINE_STATUS 14 GND 13 GND 12 GND 11 PRINT_END 10 ERROR 9 GND </div> <div> 8 GND 7 5Vto24V_EXT 6 REPRINT 5 PAUSE 4 FEED 3 START_PRINT 2 5V_EXT 1 GND </div>
	CN101	DSub9-F JST JHEY-9S-1A3A	DSub9-M (1:1 cable to host)	See [Tab. 3] and [Tab. 4].

■ CAUTION - Pin assignment from „PC point of view“ (printer = DCE)!

RS 232

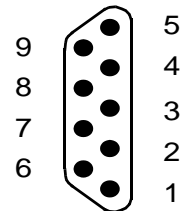
Pin	Signal name (host)	Signal direction from I/O board
1	DCD	Short with DTR and DSR
2	RxD	Out
3	TxD	In
4	DTR	Short with DCD and DSR
5	GND	Ground
6	DSR	Short with DTR and DCD
7	RTS	In
8	CTS	Out
9	(RI)	Not connected



[Tab. 3] Pin assignment RS 232 connector

RS 422/485

Pin	Signal name (host)	Signal direction from I/O board
1		Not connected
2	Rx-	Out
3	Tx-	In
4	Term.	Termination (110 Ohm)
5	GND	Ground
6	Term.	Termination (110 Ohm)
7	Tx+	In
8	Rx+	Out
9		Not connected



[Tab. 4] Pin assignment RS 422/485 connector

RS 422/485 termination

At the *last* printer at the RS 422/485 line, connect the following pins (inside of the cable connector):

- Pins 3 and 4 (Tx-)
- Pins 6 and 7 (Tx+)

RS 485 2-wire connection

At *each* printer on the bus line, connect the following pins (inside of the cable connector):

- Pins 2 and 3 (Tx-/Rx-)
- Pins 7 and 8 (Tx+/Rx-)

Application

The I/O board may be used for 3 different applications:

- *2nd RS 232 interface:*

The I/O board provides a RS 232 interface, which can be applied additionally to the one on the CPU board. The 2nd interface can e.g. be used to connect a bar code scanner.

- *RS 422/485 interface:*

If there is a long distance between host and printer, RS 485 or RS 422 is sometimes used instead of RS 232 or Centronics. This is often realized in industrial plants, where galvanic isolation is required to avoid ground loops.

- *Signal interface:*

If an applicator is applied with the printer, this requires the exchange of control signals between printer and applicator. Therefore, signals like „printing is finished“ have to be generated by the printer and the printer itself must wait for a signal like „start print“ from the applicator, before it starts printing the next label. Galvanic isolation is provided for robustness. The output signals can also be used to drive signal lamps.

■► The two serial interface types cannot be used at the same time.

■► Signal interface and serial interface can be used at the same time. The signals of both interfaces must then be related to the same supply system (same ground potential).

Setting the Interface Parameters

With an I/O board mounted, the following additional menus appear in the printer menu:

- **INTERF. PARAM. > COM2 PORT**
Contains all parameters required to configure the serial interface.
- **I/O BOARD**
Contains all parameters required to configure the signal interface.

Menu	Parameter	Setting
INTERF. PARAM. > COM2 PORT	Baud rate	9600
	No. of data bits	8
	Parity	None
	Stop Bits	1
	Data synch.	RTS/CTS
	Serial Port Mode	RS 232
SYSTEM PARAMETER	External signal	Singlestart
	Reprint function	Enabled
I/O BOARD	Start delay	0.0 mm
	Start print mode	Pulse falling
	Reprint signal	Enabled
	Feed	Standard
	Pause input	Standard
	Error output	Print error
	Error polarity	Level low active
	Status output	Print job ready
	Status polarity	Level low active
	End print mode	Mode3 low pulse

[Tab. 5] Recommended parameter default settings.

- For detailed parameter descriptions see topic section [Info-printouts & Parameters](#).

Input/Output Signals

Internal supply

The I/O board provides a galvanically decoupled 5 V source. External electronics, powered from this source, must not consume more than 0.5 W (5 V / 100 mA).

➡ Maximum admissible output current: 100 mA

External supply

The I/O board outputs may be powered by an external source from 5 V to 24 V (pin 7). External electronics, powered from this source, must not consume more than 200 mA per output channel.

➡ Maximum admissible output current: 200 mA

Fuses

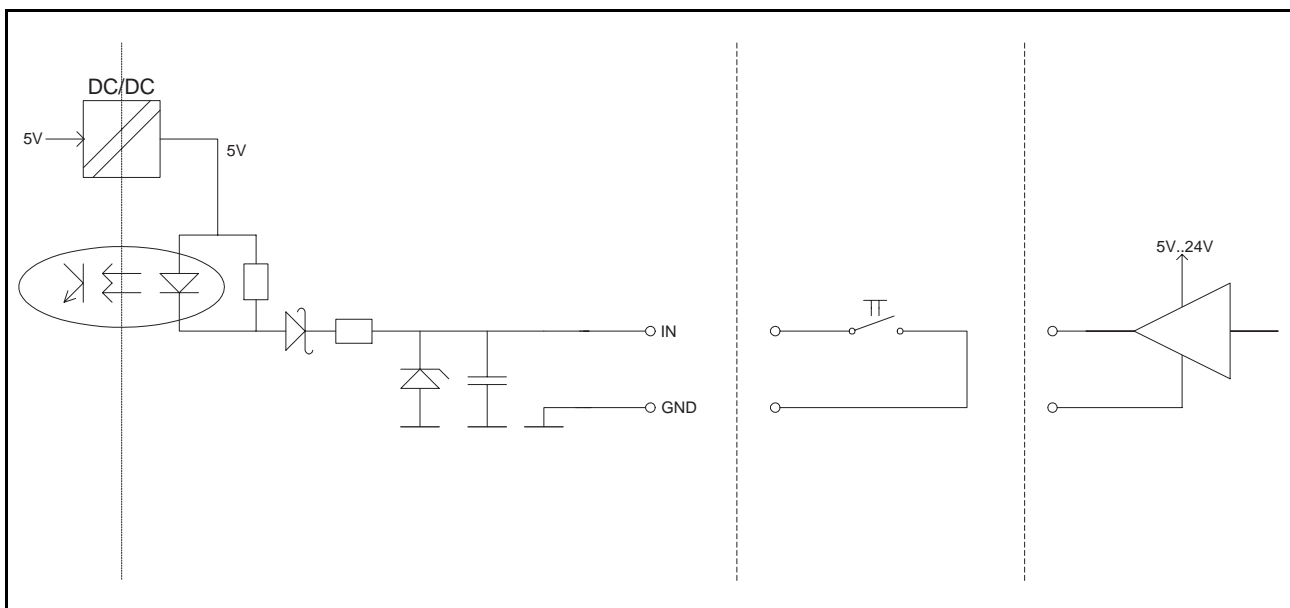
The fuses used on the I/O board are polymeric positive temperature coefficient resistors. If they trip, they don't blow and after cooling down, they work again. They don't need to be replaced.

Input signals

- START PRINT
 - FEED
 - PAUSE (optional: APSF)
 - REPRINT
- For details see topic section [Info-printouts & Parameters](#).
The input signals are powered by an internal 5 V source.

➡ Maximum admissible input voltages: 0 to 24 V

- Active (low) input signal: $V_{IL} = 0$ to 1 V at $I_{IL} \approx 10$ to 20 mA
- Inactive (high) input signal: $V_{IH} = 40$ to 24 V at $I_{IH} \approx 0$ to 1 mA
- Max. frequency for APSF signal: 10 kHz



[1] I/O board: Input circuitry and possible connections to external electronics.

[2] I/O board: Output driver and possible connections to external electronics.

Testing the Signal Interface

The USI-testbox was designed for use with the USI interface, the „big brother“ of the I/O board, matching the 64-bit printer family. But it can also be applied to the I/O board, if the following is taken into account:

Not all of the output signals on the USI board are also available on the I/O board. The pins of not available signals are grounded on the I/O board. The following signal lamps for outputs are therefore always lighting on the test-box:

- RIBBON OUT
- MEDIA OUT
- WARNING

Those inputs are not available on the I/O board:

- PLC ERROR
- TOUCH DOWN SENSOR
- HOME POS. ERROR
- MATERIAL LOW

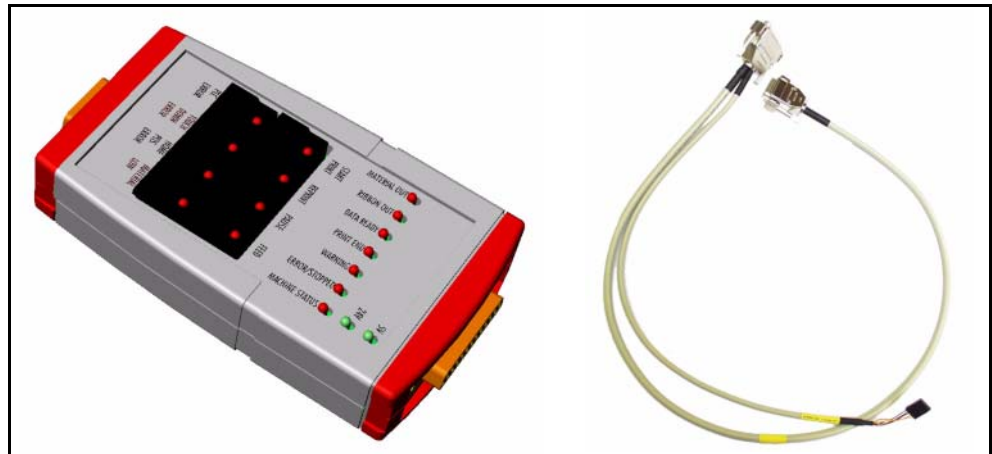
Application of the testbox

- Simulating inputs
- Checking outputs
- Monitoring of drive signals sent by the system control
- Aid for setting up the machine

Notes

The polarity of the testbox is low-active, therefore rules:

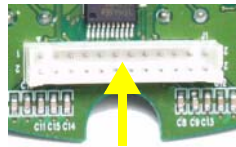
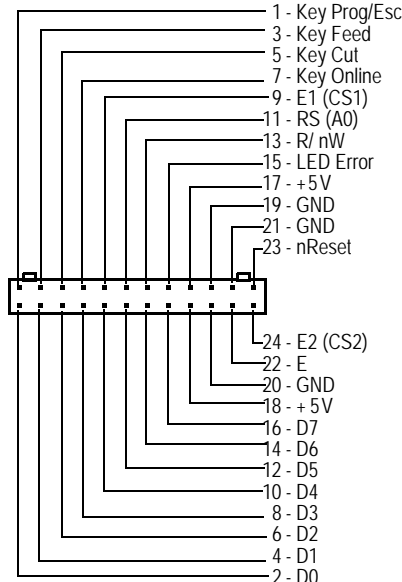
- ▮▮▮▮ Inputs are pulled low when the push-button is pressed.
- ▮▮▮▮ Outputs are low, when the LED lights.



[3] Left side: The USI testbox (A2739). Right side: Connection cable (A2842). Both parts are required for the application.

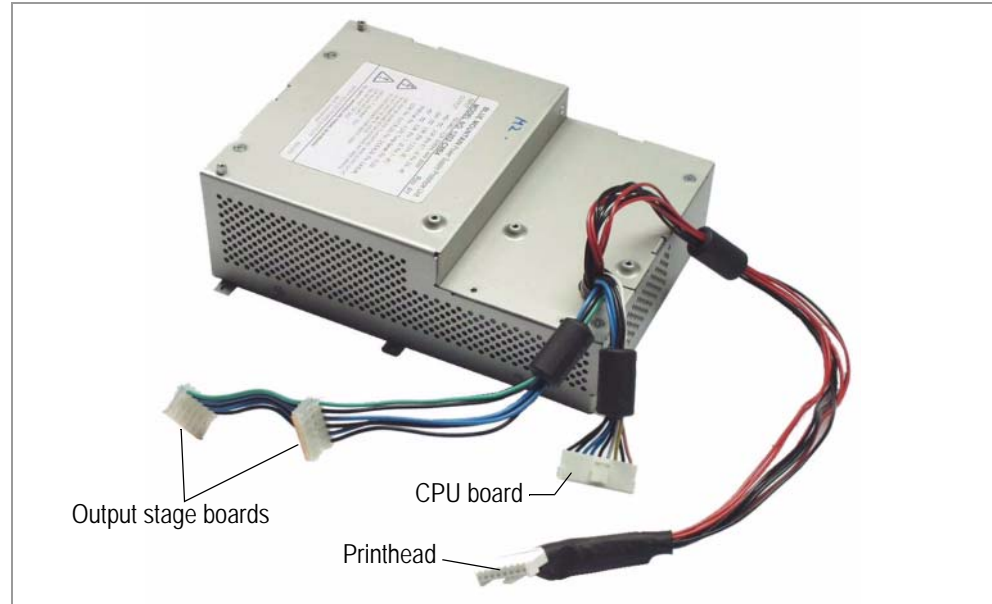
Testing the Serial Interface

- See parameter description of [SERVICE FUNCTION > Com2 port test](#) in topic section [Info-Printouts & Parameters](#).


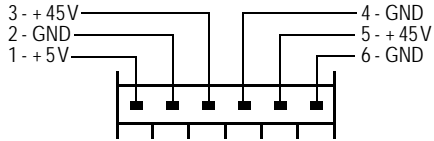
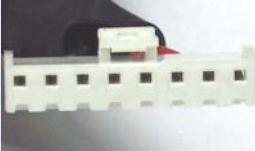
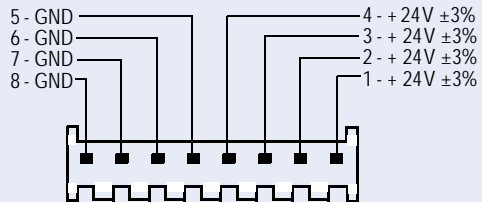
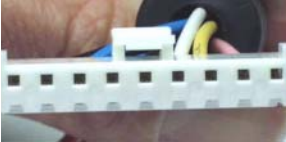
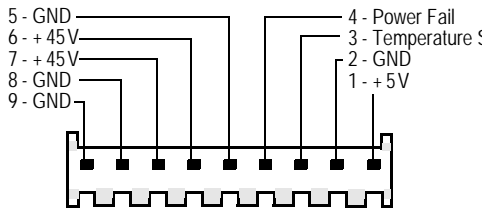
Picture	Circ. Diagr.	Type on board	Type at cable	Pin assignment on board
		JST B24B-PHDSS	JST BHDR-24VS	

Power Supply

Layout



Connectors

Picture	Power supply connector type	Counterpart	Pin assignment power supply connector
Output stage board 	AMP 0-644465-6 MTA 156 18 AWG	AMP 640389-6	
Printhead 	JST VHR-8N	JST B8PS-VH (at printhead)	
CPU board 	JST VHR-9N	JST B9PS-VH	

Specifications

Power

- Maximum continuous average output power: 196 W.
- Peak power: 276 W.
 - ▮▮▮▮▮ Peak must not last longer than 30 ms.
 - ▮▮▮▮▮ Limitation of peaks per minute: max. 3.

Voltage range

Output	Range	Max.	Min.
+45 V	+5% -10%	+47.25 V	+40.5 V
+24 V	±3%	+24.72 V	+23.28 V
+5 V	±5%	+5.25 V	+4.75 V

[6] Output voltage ranges.

- ▮▮▮▮▮ Precondition to be able to measure the output voltages correctly, is, that a minimum output current of 0.3 A is drawn from the 5 V output (minimal load). This is e. g. reached by connecting the CPU board to the power supply.
- ▮▮▮▮▮ At the 24 V and 45 V outputs, *no* minimum output current is required to measure the voltages correctly.

Current range

Output	Min.	Typical	Peak
+45 V	0,0 A	2 A	2.8 A
+24 V	0,0 A	3,8 A	7 A
+5 V	0.3 A	3.0 A	4.0 A

[7] Output current ranges.

- ▮▮▮▮▮ The 24 V output provides a continuous current of 6 A for 10 s in typical operation.
- ▮▮▮▮▮ Without a minimum load at the 5 V output, the voltage at 24 V and 45 V supply should not be higher than 28 V and 50 V respectively.

Sensor settings

Setting sensors (AP 4.4/AP 5.4)

The following cases require the sensor or all sensors to be set newly:

- A sensor was replaced
- The CPU board was replaced
- A punch sensor fork with additional reflex sensor was mounted (only possible with AP 5.4).

Punch sensor

1. Start the printer in production mode and call parameter `SERVICE FUNCTION > Sensor Adjust.`
- For more information about production mode, refer to the description of parameter `SYSTEM PARAMETERS > Access authoriz..`

The following message shows up:

```
Sensor Adjust
140 Punch 16
```

The *left* value is the control value for the LED current (Default: 140).

The *right* value is the sensor value read back.

The more light the sensor receives, the less is the read back value.

2. Remove any material from the label sensor fork.
3. Increase or decrease the control value by pressing the Feed or Cut button until the read back value is in the range of 8..20 (best at 13..15).
4. Insert some standard material backing paper (labels peeled off) to verify the read back value.

■ Glossy side up.

■ The backing paper must cover the light barrier.

The read back value should match the range of 40..90.

5. Insert some standard self-adhesive material (paper label on backing paper) to verify the read back value.

The read back value should match the range of 100..220 and it *must* be more than 50 (best: 100) digits higher than the value measured with bare backing paper.

If the value doesn't match this range: modify the control value by pressing the Cut or Feed button.

6. Press the Online button to save the setting.
7. Press the Esc button to exit the parameter.

With this, the punch sensor is set.

Ribbon sensor

1. Start the printer in production mode and call parameter `SERVICE FUNCTION > Sensor Adjust`.
2. Press the Online button repeatedly, until the following is displayed:

```
Sensor Adjust
128 Foil 6
```

The *left* value is the control value for the LED current (Default: 128).
The *right* value is the sensor value read back (here: 6).

3. Turn the ribbon unwinding mandrel by hand and watch the read back value.

Sensor uncovered: the value should match the range 5..7.

Sensor covered: the value should match the range 220..255.

If the value doesn't match this range: modify the control value by pressing the Cut or Feed button.

4. Press the Online button to save the setting.
5. Press the Esc button to exit the parameter.

With this, the ribbon sensor is set.

Printhead sensor

1. Start the printer in production mode and call parameter `SERVICE FUNCTION > Sensor Adjust`.
2. Press the Online button repeatedly, until the following is displayed:

```
Sensor Adjust
128 Head 236
```

The *left* value is the control value for the LED current (Default: 128).
The *right* value is the sensor value read back (here: 236).

3. Open and close the pressure lever by hand and watch the read back value.

Pressure lever open: the value should match the range 5..7.

Pressure lever closed: the value should match the range 220..255.

4. Press the Online button to save the setting.
5. Press the Esc button to exit the parameter.

By doing so, the printhead sensor is set.

Reflex sensor

■▶ Setting only for AP 5.4 with optional reflex mark label sensor!

1. Start the printer in production mode and call parameter **SERVICE FUNCTION > Sensor Adjust.**
2. Press the Online button repeatedly, until the following is displayed:

```
Sensor Adjust
112 Reflex 17
```

The *left* value is the control value for the LED current (Default: 112).
The *right* value is the sensor value read back (here: 17).

3. Insert some white paper.
4. Increase or decrease the control value until the read back value matches the range of 8..20 (best: 10).
5. Remove the white paper to verify the read back value. It should match the range of 50..160.
6. Insert some black paper to verify the read back value. It should match the range of 190..255.
7. Press the Online button to save the setting.
By doing so, the reflex sensor is set.

**Punch sensor
for short labels**

■▶ Setting only for AP 5.4 dispenser with optional punch sensor for short labels!

- For further information about this punch sensor, see topic section [Service Mechanics](#), paragraph „Punch sensor for short labels“.
1. Start the printer in production mode and call parameter **SERVICE FUNCTION > Sensor Adjust.**
 2. Press the Online button repeatedly, until the following is displayed:

```
Sensor Adjust
140 optn.1 7
```

The *left* value is the control value for the LED current (Default: 140).
The *right* value is the sensor value read back (here: 7).

3. Remove any material from the label sensor fork.
4. Increase or decrease the control value by pressing the Feed or Cut button until the read back value is in the range of 8..20 (best at 13..15).
5. Insert some standard material backing paper (labels peeled off) to verify the read back value.
The read back value should match the range of 30..90.
6. Insert some standard self-adhesive material (paper label on backing paper) to verify the read back value.

The read back value should match the range of 100..220 and it *must* be more than 50 (best: 100) digits higher than the value measured with bare backing paper.

If the value doesn't match this range: modify the control value by pressing the Cut or Feed button.

7. Press the Online button to save the setting.
8. Press the Esc button to exit the parameter.

With this, the punch sensor is set.

Setting sensors (AP 7.t)

The following cases require the sensor or all sensors to be set newly:

- A sensor was replaced
- The CPU board was replaced
- A punch sensor fork with additional reflex sensor was mounted.

This is how to set the sensors:

- ➔ Start the printer in production mode and call parameter `SERVICE FUNCTION > Sensor adjust.`
- For more information about production mode, refer to the description of parameter `SYSTEM PARAMETERS > Access authoriz.`
- ➡ To jump to the next sensor without changing the current settings, press the online button.

The following message shows up:

```
Sensor Adjust
140  Punch  16
```

The *left* value is the control value for the LED current (Default: 140).

The *right* value is the sensor value read back.

The more light the sensor receives, the less is the read back value.

Changing the setting:

1. Remove any material from the label sensor fork.
2. Increase or decrease the control value by pressing the Feed or Cut button until the read back value is in the range of 8..20 (best at 13..15).
3. Insert some standard material backing paper (labels peeled off) to verify the read back value.
 - ➡ Glossy side up.
 - ➡ The backing paper must cover the light barrier.

The read back value should match the range of 40..90.
4. Insert some standard self-adhesive material (paper label on backing paper) to verify the read back value.

The read back value should match the range of 100..220 and it *must* be more than 50 (best: 100) digits higher than the value measured with bare backing paper.

If the value doesn't match this range: modify the control value by pressing the Cut or Feed button.

5. Press the Online button to save the setting.

Punch sensor

Ribbon sensor

Next, the settings of the ribbon sensor are displayed:

Sensor Adjust
128 Foil 6

The *left* value is the control value for the LED current (Default: 128).
The *right* value is the sensor value read back (here: 6).

1. Turn the ribbon unwinding mandrel by hand and watch the read back value.

Sensor uncovered: the value should match the range 5..7.

Sensor covered: the value should match the range 220..255.

If the value doesn't match this range: modify the control value by pressing the Cut or Feed button.

2. Press the Online button to save the setting.

With this, the ribbon sensor is set.

Pressure roll switch

Next, the settings of the pressure roll switch are displayed:

Sensor Adjust
128 Lever 236

■ Because this is a switch, not a light barrier, the function can only be checked. Settings are not possible.

Left value: 128 (stays unchanged)

Right value:

- 0 (Pressure roll lever open)
- 220...255 (Pressure roll lever locked)

3. Open and close the pressure roll lever by hand and watch the read back value.
4. Press the Online button.

Reflex sensor (bottom)

Next, the settings of the bottom reflex sensor are displayed:

Sensor Adjust
112 Reflex 17

The *left* value is the control value for the LED current (Default: 112).

The *right* value is the sensor value read back (here: 17).

■ The bottom reflex sensor is an *optional* component. If the printer doesn't have a bottom reflex sensor built in, skip this section by pressing the Online button.

1. Insert some white paper.

■ The paper stripe must be pulled tight while the setting is checked, similar to the conditions during printing operation.

■ If the printer is equipped with an additional reflex sensor on the top side, the test paper *must be* light-proof! Put thick enough cardboard *under* the paper, if it is not.

2. Increase or decrease the control value until the read back value matches the range of 8..20 (best: 10).

3. Remove the white paper to verify the read back value. It should match the range of 50..160.
 - ➡ Proceed the preceding step only if the printer *doesn't have* a top side reflex sensor.
4. Insert some black paper to verify the read back value. It should match the range of 190..255.
 - ➡ The paper stripe must be pulled tight while the setting is checked, similar to the conditions during printing operation.
 - ➡ If the printer is equipped with an additional reflex sensor on the top side, the test paper *must be* light-proof! Put thick enough cardboard *under* the paper, if it is not.
5. Press the Online button to save the setting.

By doing so, the reflex sensor is set.

Reflex sensor (top)

Next, the settings of the top reflex sensor are displayed:

Sensor Adjust
112 Refl O 17

The *left* value is the control value for the LED current (Default: 112).
The *right* value is the sensor value read back (here: 17).

➡ The top reflex sensor is an *optional* component. If the printer doesn't have a top reflex sensor built in, skip this section by pressing the Online button.

1. Insert some white paper.
 - ➡ The paper stripe must be pulled tight while the setting is checked, similar to the conditions during printing operation.
 - ➡ If the printer is equipped with an additional reflex sensor on the top side, the test paper *must be* light-proof! Put thick enough cardboard *over* the paper, if it is not.
2. Increase or decrease the control value until the read back value matches the range of 8..20 (best: 10).
3. Remove the white paper to verify the read back value. It should match the range of 50..160.
 - ➡ Proceed the preceding step only if the printer *doesn't have* a bottom side reflex sensor.
4. Insert some black paper to verify the read back value. It should match the range of 190..255.
 - ➡ The paper stripe must be pulled tight while the setting is checked, similar to the conditions during printing operation.
 - ➡ If the printer is equipped with an additional bottom reflex sensor, the test paper *must be* light-proof! Put thick enough cardboard *over* the paper, if it is not.
5. Press the Online button to save the setting.

By doing so, the reflex sensor is set.

Cover switch

Next following the settings of the cover switch appear.

■ Because this is a switch, not a light barrier, the function can only be checked. Settings are not possible.

Left value: 128 (stays unchanged)

Right value:

- 0 (cover closed)
- 220...255 (cover opened)

6. Open and close the front cover of the printer and watch the read back value.
7. Press the Cut+Online+Feed buttons simultaneously to save the settings and to restart the printer.

Setting the material end sensor

These printer types are equipped with a single light sensor which is designed to detect both, punches and material end. The sensor must be able to detect three different states:

- No material
- Only backing paper
- Backing paper + label face

The parameter `SERVICE FUNCTION > Matend adjust` can set the limit between being recognized as „only backing paper“ or as „material end“ [4].

■ Before you even think about changing the setting of this parameter, make sure that the sensor is correctly adjusted!

- How to? - Read about in paragraph [Setting sensors \(AP 4.4/AP 5.4\)](#) on page 25 respectively in paragraph [Setting sensors \(AP 7.t\)](#) on page 28.

Proceed as follows to set the materialend sensor:

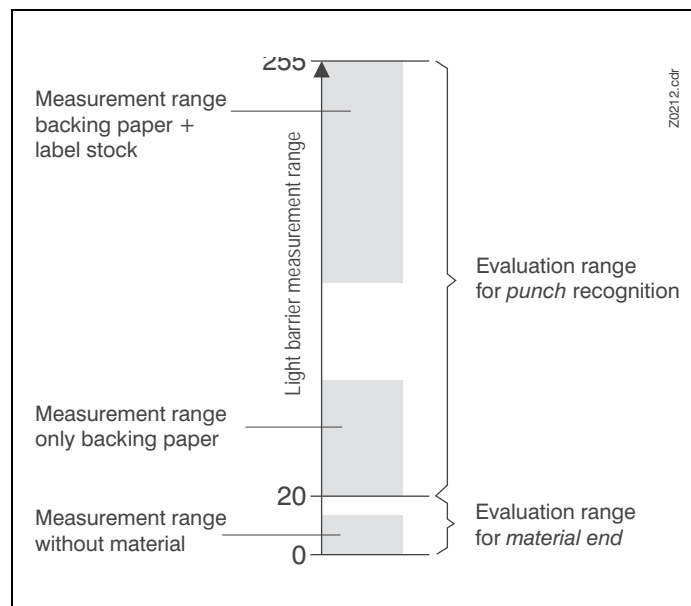
1. Call parameter `SERVICE FUNCTION > Matend adjust`:

```
Matend adjust
yyy Level :   xx
```

2. Take the label material out of the sensor fork.
3. Set the value xx to 20 by pressing the Cut/Feed buttons.

All measured values below the set limit (that is <20), are recognized by the electronics as material end, values lying above are recognized as „only backing paper“.

■ To be able to process *transparent label stock*, the parameter has to be set to zero.

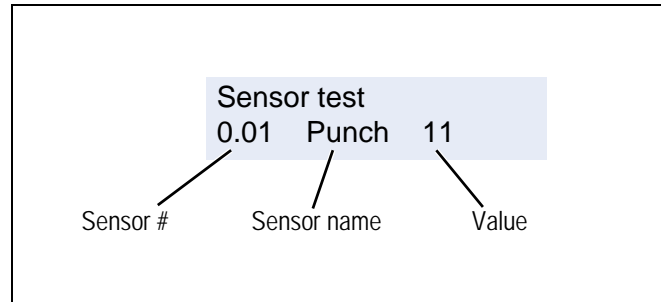


[4] The measurement ranges of the combined punch/material end sensor of the AP 4.4/ AP 5.4/AP 7.t - schematically illustrated.

Sensor test

General notes

- Activating the sensor test: call parameter `SERVICE FUNCTION > Sensor test`.
By means of the sensor test, you can check the function of each sensor:



[5] Display after calling „Sensor test“.

Digital sensors

- Some sensors work digitally, what means that they don't provide a value range, but the two values „1“ or „0“.

Analog sensors

- If the value shown on the printer display exceeds the range given in the chart below, the respective sensor is possibly dirty and has to be cleaned (blow the dirt off with compressed air).
- Check the sensor function, e.g. by covering it. If the displayed value doesn't change when the sensor is covered, it is possibly not connected or defective.
- General rule for all analog sensor values:
 - Full light leads to values ≤ 10
 - No light leads to values ≥ 220
- To sensors which function as a switch applies the following: Values between 10 and 220 mean that the sensor is poorly set, dirty or close to the end of its life.

Sensors on the CPU board (AP 4.4/AP 5.4)

Sensor #	Sensor name	Connector #	Typical value	Condition
0.01	Punch	CN 905	8-20	No material in light barrier
			30-90	Only backing paper in light barrier
			140-255	Label material in light barrier
0.02	Foil	CN 906	4-8	Light barrier open
			220-255	Light barrier covered
0.03	Lever	CN 907	4-8	Light barrier open
			220-255	Light barrier covered

[Tab. 8] Sensor test conditions for sensors, which are connected to the CPU board (AP 4.4/AP 5.4).

Sensor #	Sensor name	Connector #	Typical value	Condition
0.04	Reflex	CN 908	7-30	White material over sensor
			30-180	No material
			180-255	Black material over sensor
0.05	Optn. 1	CN 909	0-255 analogous	Reserved for special functions
			<i>Punch sensor for short labels: ^{a)}</i>	
			8-20	No material in light barrier
			30-90	Only backing paper in light barrier
			140-255	Label material in light barrier
0.06	Optn. 2	CN 910	0-255 analogous	Reserved
0.07	H-Temp	CN 901-903	appr. 100-140	Printhead is very hot
			appr. 141-255	Normal printhead temperature
0.08	P-Temp	CN 701		Power supply temperature (depends on the PS type)
0.09	H-Supp	CN 901-903	0	No 5 V supply for printhead ^{b)}
			1	5 V supply for printhead o.k.
0.10	M-Supp	CN 701	0	No motor supply voltage
			1	Motor supply voltage o.k.
0.11	Start	CN 803/804	0	Start signal low (IN1)
			1	Start signal high
0.12	O Foil	calculated value	0	Foil diameter unknown
			appr. 35-80	Foil diameter in mm
0.13	H (°C)	Value calculated out of 0.07	appr. 25-70	Temperature at printhead in °C ^{c)}

[Tab. 8] (Cont.) Sensor test conditions for sensors, which are connected to the CPU board (AP 4.4/AP 5.4).

a) Special functions.

b) Occurs e.g., if the printhead is connected to the wrong connector on the CPU board (three possibilities).

c) Below 30°C the measurement is not accurate.

Sensors on the CPU board (AP 7.t)

■ If the printer is equipped with both reflex sensors (top and bottom), the following must be taken into account:

- The sensor value of the open sensor („No material“) can not be read back.
- The label material applied for setting purposes must in any case be light-tight. If any light shines through, light-tight material (e.g. cardboard) must be laid under the label material.

Sensor #	Sensor name	Connector #	Typical value	Condition
0.01	Punch	CN 905	8-20	No material in light barrier
			30-90	Only backing paper in light barrier
			140-255	Label material in light barrier
0.02	Foil	CN 906	4-8	Light barrier open
			220-255	Light barrier covered
0.03	Lever	CN 907	4-8	Light barrier open
			220-255	Light barrier covered
0.04	Reflex	CN 908	7-30	White material over sensor
			30-180	No material
			180-255	Black material over sensor
0.05	Reflex O	CN 909	7-30	White material over sensor
			30-180	No material
			180-255	Black material over sensor
0.06	Cover	CN 910	0	Cover closed
			220-255	Cover open
0.07	H-Temp	CN 901-903	appr. 100-140	Printhead is very hot
			appr. 141-255	Normal printhead temperature
0.08	P-Temp	CN 701		Power supply temperature (depends on the PS type)
0.09	H-Supp	CN 901-903	0	No 5 V supply for printhead ^{a)}
			255	5 V supply for printhead o.k.

[Tab. 9] Sensor test conditions for sensors, which are connected to the CPU board (AP 7.t).

Sensor #	Sensor name	Connector #	Typical value	Condition
0.10	M-Supp	CN 701	0	No motor supply voltage
			255	Motor supply voltage o.k.
0.11	Start	CN 803/804	0	Start signal low (IN1)
			255	Start signal high
0.12	O Foil	calculated value	0	Foil diameter unknown
			appr. 35-80	Foil diameter in mm
0.13	H (°C)	Value calculated out of 0.07	appr. 25-70	Temperature at printhead in °C ^{b)}

[Tab. 9] (Cont.) Sensor test conditions for sensors, which are connected to the CPU board (AP 7.t).

a) Occurs e.g., if the printhead is connected to the wrong connector on the CPU board (three possibilities).

b) Below 30°C the measurement is not accurate.

Sensors on the stepper motor output stage board (AP 5.4)

Sensor #	Sensor name	Connector #	Periph.	Typical value	Condition
4.01	Peri. 1	J4	Dispensing edge light barrier	0	Dispensing edge light barrier open
				255	Dispensing edge light barrier covered
			Cutter	<=10	Cutter in end position
				255	Cutter not in end position
			External Rewinder	0...255	Dancer arm position

[Tab. 10] Sensor test conditions for sensors, which are connected to the output stage board (stepper motor, AP 5.4).

Sensors on the stepper motor output stage board (AP 7.t)

Sensor #	Sensor name	Connector #	Typical value	Condition
1.01	Option	J4	--	Without function
1.02	Option	J8	--	Without function
3.01	Headlift	J4	<=10 >=220	Printhead sensor open Printhead sensor covered
3.02	Option	J8	--	Without function
4.01	Peri. 1	J4	255 <=10	Light barrier covered (TCS: Top blade at the upper limit position) Light barrier open
4.02	Peri. 2	J8	<=10 255	(TCS-) cover switch closed and stacker not full (TCS-) cover switch open or stacker full

[Tab. 11] Sensor test conditions for sensors, which are connected to the output stage board (AP 7.t).

Sensors on the BLDC motor output stage board (AP 5.4)

■ Only valid for...

- „AP 5.4 peripheral with internal rewinder“, or
- „AP 5.4 basic“, with retrofitted internal rewinder,
- if the dispensing edge light barrier is connected to the BLDC output stage board.

Sensor #	Sensor name	Connector #	Typical value	Condition
8.01	Rew.S.	J4	0 255	Dispensing edge light barrier open Dispensing edge light barrier covered
8.02	O Rew	calculated Value	0 ca. 35-120	Ø of the backing paper rewinder roll is not known Ø of the backing paper rewinder roll in millimeters

[Tab. 12] Sensor test conditions for sensors, which are connected to the BLDC motor output stage board (AP 5.4).

Sensors on the I/O board:

Sensor #	Sensor name	Connector #	Typical value	Condition
15.01	Start	CN 803/804	0	Start signal activated
			1	Default start signal ^{a)}
15.02	Feed	CN 804	0	Feed signal activated
			1	Default feed signal
15.03	Pause	CN 804	0	Pause signal activated
			101	Dynamic signal, see T and F
			255	Default pause signal
15.04	Reprt	CN 804	0	Reprint signal activated
			1	Default reprint signal
15.05	T (us)	CN 804	0	APSF signal periodic time < 1 μ s
			1-254	Periodic time in μ s
			255	Periodic time > 254 μ s
15.06	T (ms)	CN 804	0	APSF signal periodic time < 1 ms
			1-13	Periodic time in ms
			255	Invalid value
15.07	F (Hz)	CN804	0	APSF signal frequency < 76 Hz
			76-254	Frequency in Hz
			255	Frequency more than 254 Hz
15.08	F100Hz	CN804	0	APSF signal frequency < 100 Hz
			1-ca. 140	Frequency in multiples of 100 Hz ^{b)}

[Tab. 13] Sensor test conditions for sensors, which are connected to the I/O board.

a) Is identical with 0.12

b) Take care about the maximum frequency rating of the I/O-board!